

HITROL CO., LTD.

HEAD OFFICE.FACTORY.R&D INSTITUTE
HITROL CO., LTD. 141, Palhakgol-gil, Jori-eup
Paju-si, Gyeonggi-do, Korea
TEL. : (00)+82-31-950-9700
FAX. : (00)+82-31-943-5600
www.hitrol.com



INSTRUCTION MANUAL

VIBRATION TYPE LEVEL SWITCH

HTM-30N Series



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You should be well-informed of the contents where **WARNING** is marked before carrying out the work.



You should be careful where **CAUTION** is marked to carry out the work.



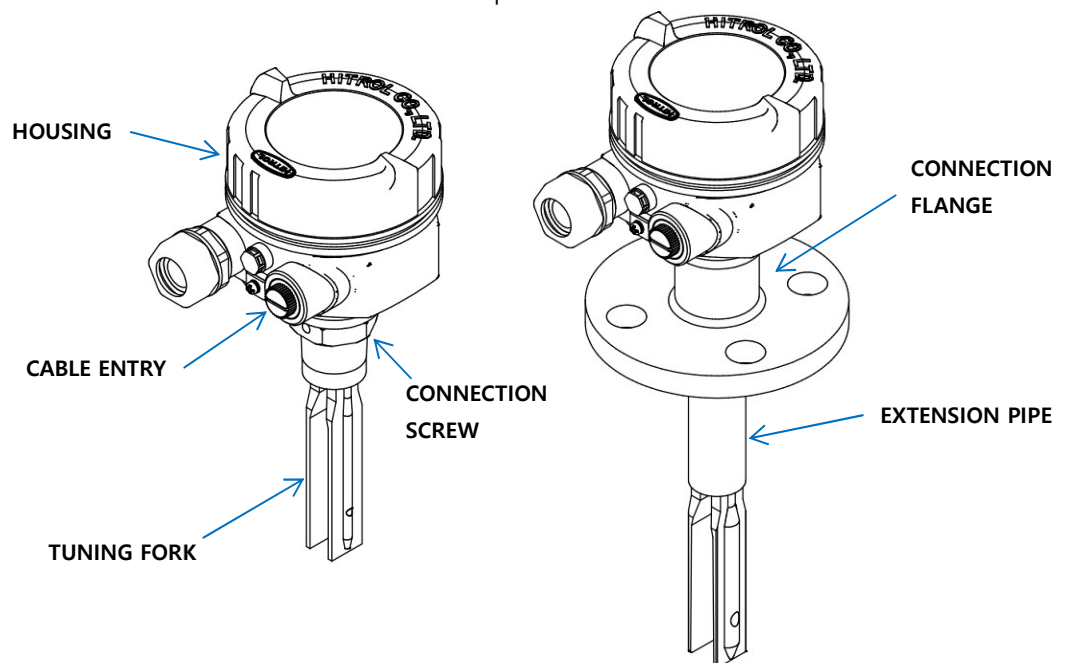
You should be aware of where **NOTICE** is marked to carry out the work.

Overview

The HTM-30N Series is a tuning fork-type vibrating level switch that consists of one membrane and two stainless forks to detect powder and output the state using the relay contact, which is applicable for alarm and process control.

Operation

A certain level of electric signal is transferred to the piezo sensor so as to vibrate the tuning fork. The vibration of the latter is reduced when it comes in contact with the subject. As such, the electric signal is reduced to stop the oscillation of the piezo sensor. The electric signal is detected by the electronic circuit to operate the relay, so that the state can be detected with the contact output.

Principle and Composition**Characteristics**

- Applicable for various solid or Liquid.
- It is semi-permanent with a solid structure and no mechanical drive.
- Available for Measurement Range Setting.
- Easy to Control the Relay Contact(N.O, N.C).
- Explosion-proof type is available.

Specifications Product Spec.

Model	HTM-30N	HTM-30N-Ex-(**)
Mounting	Screw or Flange	
Housing ; Cable Entry	PBT / ALC ; 2-PF 1/2"(F)	ALC ; 2-PF 1/2"(F)
Enclosure	Weather-Proof (PBT ; IP65 / ALC ; IP66)	Ex tD A21 IP66 T85°C/T160°C(*) Ex d IIC T3/T4/T5/T6(*), IP66
Max. Temperature	PBT Housing: 80°C ALC Housing: 150°C	(*) Ex tD/ Ex d Fluid Temp. & Grade Ex tD : Max. 50°C for T85°C Max. 150°C for T160°C Ex d : Max. 150°C for T3/Max. 100°C for T4 Max. 60°C for T5 / Max. 50°C for T6
Ambient Temperature	-20°C ~ +60°C	
Max. Process Pressure	20kgf/cm ² (Screw Type)	
Power Source	AC 90V~240V, 50/60Hz / DC +24V	
Output Signal	DPDT	
Wetted Part Material	SUS 316L + SCS 14 / HASTELLOY-C (Opt.)	
Process Connection	PT 1"(M)	
Installation	Side or Top	
Contact Rating	AC 250V, 5A / DC 30V, 5A	

(*) Ex tD/ Ex d Fluid Temp. & Grade

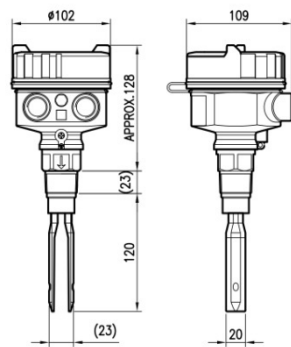
(**) Product identity

Amplifier Spec.

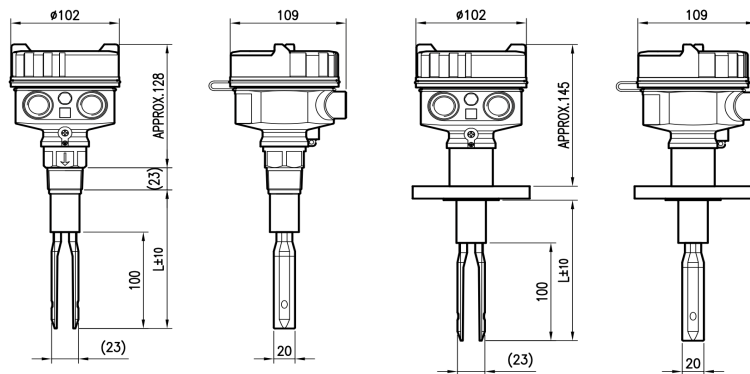
Item	Specification
Module	M-30N
Microprocessor	16Bit Microprocessor
Oscillation Frequency	650Hz @ ± 50Hz
Sensitivity Resolution	1Hz
Density of Medium	0.6g/cm ³ @ Min. (Liquid)
Function (Adjustment)	<ul style="list-style-type: none"> ■ Sensitivity ■ Relay Delay Time ■ Relay Contact Control (Normal / Reverse)
Relay Contact Out Control	Normal Close @ Default.
Status Indicator	Bi-Color LED [Green / Red / Orange]
Detection Indicator	RED LED
Relay Control Indicator	GREEN LED
Dimensions	80mm x 65mm x 54mm
Ambient Temperature	-20°C ~ +80°C

Dimensions

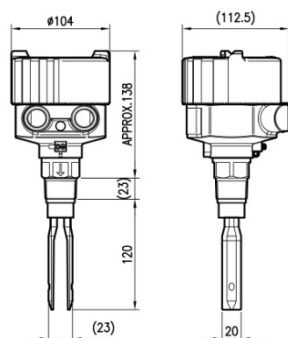
- HTM-30N(Weather-proof)



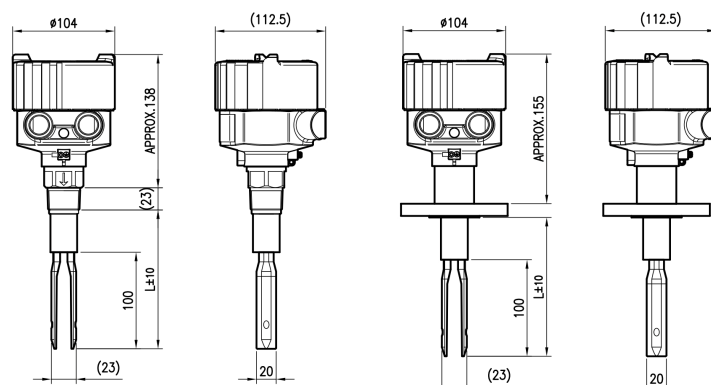
Standard type (PBT)



Extension type (PBT)



Standard type (AL.C)

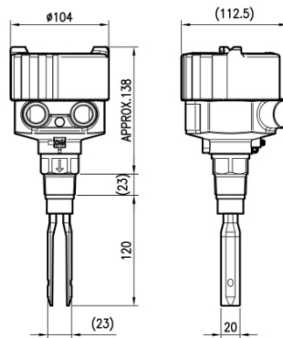


Extension type (AL.C)

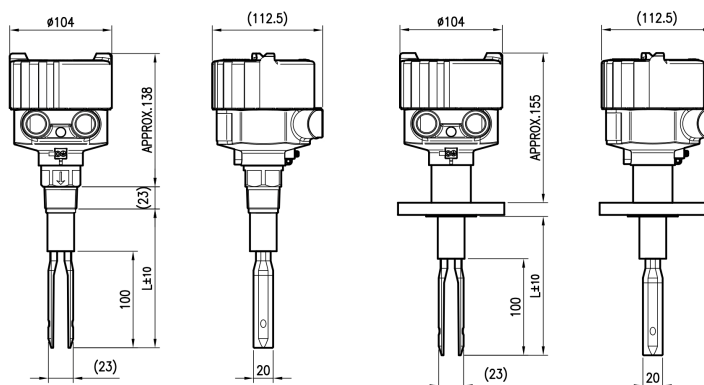


Actual product may have a tolerance slightly.

■ HTM-30N-Ex(Explosion-proof)



Standard type (AL.C)



Extension type (AL.C)



Actual product may have a tolerance slightly.

Installation

- When installing the Sensor, avoid bumps or obstructions.
- Fluid flow is severe near the outlet, and mechanical damage or chattering can occur, so installation should be avoided in this area.
- The temperature and pressure generated inside the tank must be checked to the specification.
- Condensation may occur if the temperature of the housing differs significantly from the ambient temperature. Dehumidifier filling or Gortex must be applied.
- When tightening flanges or screws, they must be of the same size.
- Make sure to insert gaskets between flanges. (Select the gaskets in consideration of the temperature of the content and the pressure inside the container.)

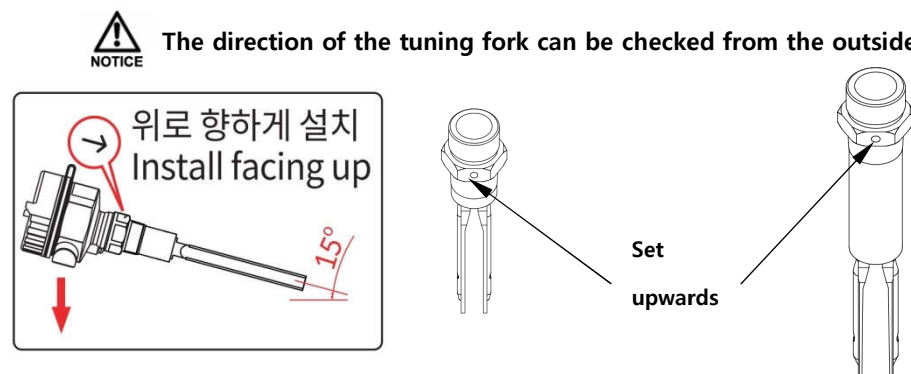


In the case of explosion-proof products, you shall apply the appropriate rating for your installation.

Precautions for Installation

HTM-30N Series is installed on the top or the side of a container and silo to detect the upper or the lower limit, respectively. The level switch can be installed on any material, so it is applicable to ferrous or nonferrous tanks and silos. When installing this product, consider the following:


- When installation, the process connection should be screw or flange type, and a length of the screw should not be over 24mm. Otherwise, dust or foreign matter may enter, resulting in a malfunction. For horizontal installation, mark indicated in below drawing facing upward and installing the wide surface of the fork vertical.



- To prevent buildup, the product should be installed at an inclination of 15° or more. In addition, the wing of the sensor must be installed vertically.
- Sensor shall be installed at the place far from inlet of the tank and protector shall be installed in order to protect the sensor from damage by falling medium if it is installed at the inlet. The protector shall have sufficient area to protect the sensor from incoming medium and be installed at a distance that does not affect sensor operation.
- Cable lead-in inlet must face the direction shown in the figure.
- If the housing temperature rises because of direct sunlight, install a sun cover to prevent such occurrence.

AMP & Wiring

- Connect AC (90~240V) or DC (24V) according to the power specifications.
- Make sure to connect the power with the correct polarity (+,-).
- Do not connect the wire with the power connected.
- This product provides DPDT. Wire it with COM and NO Terminal to use High Contact.
- Make sure to connect it to an external ground.


For explosion-proof products, apply power after tightening the cover.

Precautions for Use

The level switch that prevents the vibration of the tuning fork is good for most of the bulk materials, but the following need to be taken in consideration.

- Do not install in a hazardous area unless it is an explosion-proof product (HTM-30N-Ex).
- The explosion-proof product (HTM-30N-Ex) can be installed in zone 1 and zone 2.
- Do not use when the temperature is out of the ambient temperature range (-20°C ~ +60°C).
- Do not use if the degree of protection is higher than IP 66
- Do not use in a place with vibration.

Precautions for Removal

- Check the level and presence of liquid in the tank before removing it.
- Overheated product may cause burn, so wear gloves to remove it.
- Remove it with the power disconnected.
- Make sure that any O-ring or gasket is not damaged while opening or closing the cover.



If there is explosive gas in the atmosphere, do not open the cover.



Make sure that it is not subject to any high impact when moving.

Safety & Environment

- Cautions for Use
 - Make sure to connect the product and the container using the required tools.
 - Do not cause high impact to the product.
- Cautions for Wiring
 - Make sure to connect contacts with the correct terminals. (Refer to Wiring.)
 - Wire and supply the power to the device after checking the specifications.
 - Incorrect power voltage may cause damage to the device.
 - Pay attention to prevent electric shock.
- Disposal

Make sure to separate the AMP and main unit from the housing before disposing the product. No part has an influence on the environment, so special attention is not required (e.g., mercury switch).

**Precautions
for Lead-In
Method of
External Wire**

■ External wiring precautions (Explosion-proof type)

Certified cable gland (Ex d IIC, Ex tD A21, IP66, PF 1/2") must be used for cable entry.

Unused inlets must be sealed with certified plugs (Ex d IIC, Ex tD A21, IP66, PF 1/2").

■ Grounding Precautions

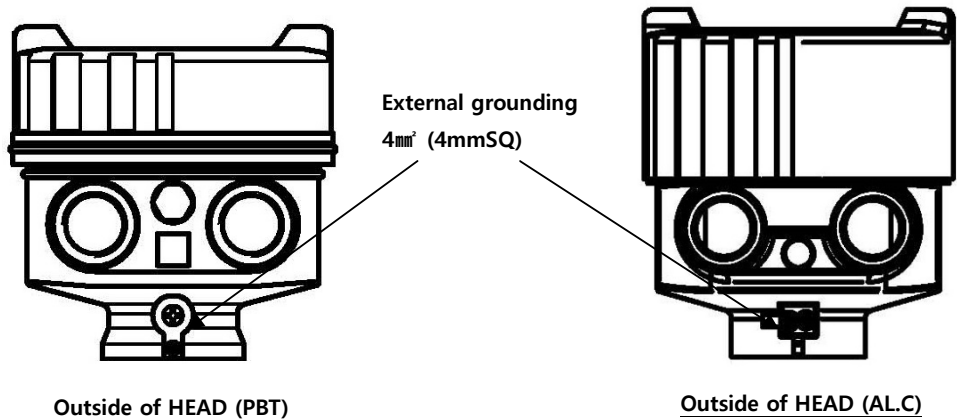
- The location of external grounding is experimental, and when connecting external grounding, the size of the grounding wire must be over 4 mm² and monitored. (Internal grounding is connected with the same specification as the connecting cable.)

- The internal grounding line should be the same length as the power line, and the size of the internal grounding terminal lug should be 3.1mm² so if the power line is larger than 3.1mm², connect the grounding line with the terminal lug facing each other.



When inserting external(power and signal lines), wire thickness of AWG 24~14(0.2mm²~2.1mm²) is applied.

Make sure to insert a washer if the terminal lug is removed from the ground terminal and subsequently reconnected. (Loosening prevention)



**Failure Check
& Maintenance**

■ Maintenance

The main inspection parts of the vibrating level switch are divided into the sensor and transmission parts. The life span of the major components depends on user's environment and can be used in optimal condition through periodic checks. Therefore, the user shall check and maintain at least once a year. Inspection of the appearance of the product shall be visually checked to see if there is any damage, and the attachment of the medium or foreign substances to the sensor will make it worse, so they shall be removed regularly.

■ Failure Check

- 1) Is the power connection correct?
- 2) Is the power voltage supplied correctly?
- 3) Is cable wiring correct?
- 4) Is the FAIL-SAFE MODE setting correct?



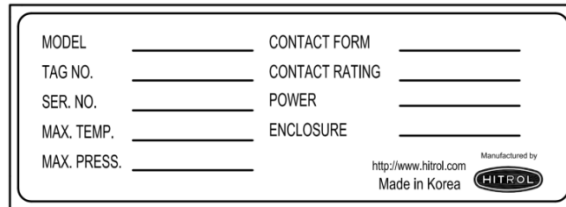
Turn off the power of the product for maintenance.

In a hazardous area, do not disassemble when power is applied.

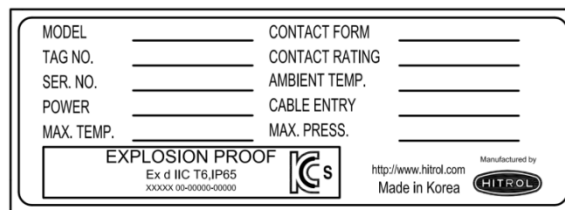
Marking

■ Product Identification

The product identification mark is attached onto the shows the model name, serial number, working temperature, working pressure, and matters regarding output. The serial number is a unique manufacturing number for the identification of products.



< Weather Proof >



< Explosion Proof >

The device is certified by KOSHA.



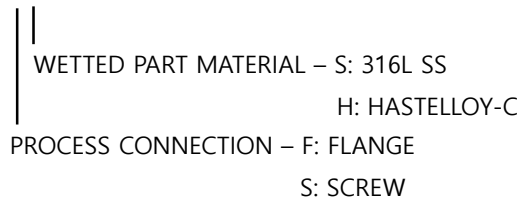
Ex d : 20-AV2BO-0579X / Ex d IIC T3/T4/T5/T6, IP66

Ex tD : 20-AV2BO-0681X / Ex tD A21 IP66 T85°C/T160°C

Product Identity

The product composition of the HTM-30N-Ex Series is as follows.

HTM-30N-Ex-* *



User Training

Under the aforementioned, do not exceed 150°C, respectively, for the liquid in containers when using the product. In addition, make sure that the ambient temperature of housing is kept at -20 to +60°C.

Explosion-proof products are designed according to Article 34 of the Industrial Safety and Health Act and Article 58-4 of the Enforcement Regulations of the same Act.



Do not apply general products to hazardous areas and explosion-proof products can only be used in zone 1 and zone 2.

Install in accordance with explosion-proof temperature rating and fluid temperature.

**Warranty
& Contact**

■ Warranty & Service

This product is subject to a two-year shipment warranty. Unpaid service will be provided for any damage found under normal operating conditions. If it does not refer to product failure, payment will be required for the service charge.

You can request for A/S through our website or by contacting our headquarters.

■ Headquarters · Factory · Laboratory Contact Number

Address : HITROL CO.,LTD 141, Palhakgol-gil, Jori-eup, Paju-si, Gyeonggi-do, Korea

TEL : 031-950-9700 (Headquarters and A/S)

FAX : 031-943-5600 (Headquarters and A/S)

APPENDIX G



M-20N

User Manual

Vibration Type Level Switch



Doc. no. : Rev1.0

Issued Date : 2023.11.01

1. Configuration of Module (M-30N)

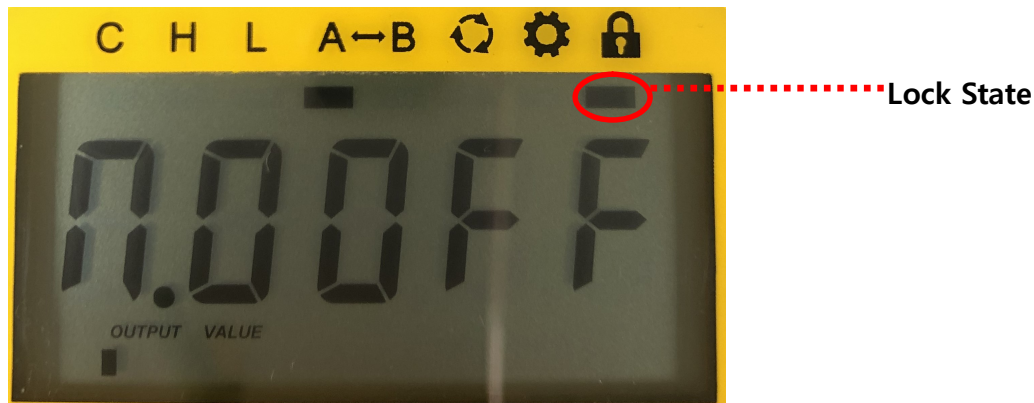


No	Configuration	Function
1	S Key	<ul style="list-style-type: none"> ■ Function setting ■ Save the setting
2	M Key	<ul style="list-style-type: none"> ■ Mode change ■ Cancellation
3	▲ Key	<ul style="list-style-type: none"> ■ High Set ■ Setting the value up
4	▼ Key	<ul style="list-style-type: none"> ■ Low Set ■ Setting the value down
5	LCD	<ul style="list-style-type: none"> ■ Display of operating and setting status
6	LED	<ul style="list-style-type: none"> ■ Display of power and status
7	Power	<ul style="list-style-type: none"> ■ For supply power (AC / DC)
8	F.G	<ul style="list-style-type: none"> ■ Frame Ground
9	Relay Out	<ul style="list-style-type: none"> ■ Relay Contact Out (DPDT)

2. Configuration of Setting Menu

No.	Contents	Description
[02]	Low Value Set	Set the Low value by viewing the current Voltage value
[03]	High Value Set	Set the High value by viewing the current Voltage value
[08]	Relay Contact Type	N.O or N.C (Default : N.O)
[09]	Relay Delay Time Set	0.5 ~ 10 sec. (Default 0.5 sec @ 0.5 sec Step ADJ.)
[11]	LOW Capacity fine Adjustment	Find adjustment from settled capacitance value. (0.001V, 0.01V, 0.1V)
[12]	HIGH Capacity fine Adjustment	
[30]	Rotation Time Set	0.5 ~ 10 sec. (Default 3 sec @ 0.5 sec Step ADJ.)
[31]	'C' Display On/Off	Rotation 'C' select display (Current Frequency value)
[32]	'H' Display On/Off	Rotation 'H' select display (High Frequency setting value)
[33]	'L' Display On/Off	Rotation 'L' select display (Low Frequency setting value)
[34]	'A↔B' Display On/Off	Rotation 'A↔B' select display (Relay Contact Type & ON/OFF)
[90]	Error Number Output	Display of error number according to malfunction
[91]	Frequency value Output	Low, High, display current Voltage value
[99]	Firm Ware Version	Display of Firm Ware Version
[100]	Reset	Reset the all setting

3. M-30N LOCK Turn off/Setting Way



※ When power is applied, the initial screen shows Relay Contact Type, Lock status. (When in the LOCK state, the key does not respond.)

■ Key LOCK Turn off

- (S), (M), (▼), (▲) Press for approximately 1 second at the same time to release.
- In the photo, the cursor bar under the lock disappears.

■ Key LOCK Setting

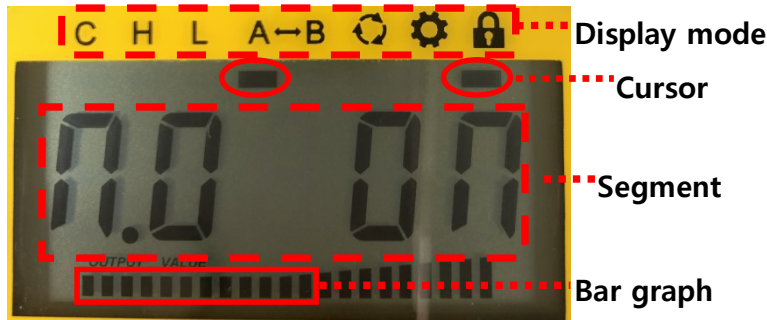
- (S), (M), (▼), (▲) Press for approximately 1 second at the same time to set it up.
(Set in the unlocked state.)
- When locked, it automatically switches to relay display mode.
- In the photo, a cursor bar is displayed under the lock.

■ Display mode automatic switching

- If the button key is not pressed, it automatically switches to the LOCK state after counting 5 minutes.
- If you press the button key along the way, the count will resume after initialization.
- It does not switch when setting the SET Menu.

4. Setting and Operating

■ LCD configuration

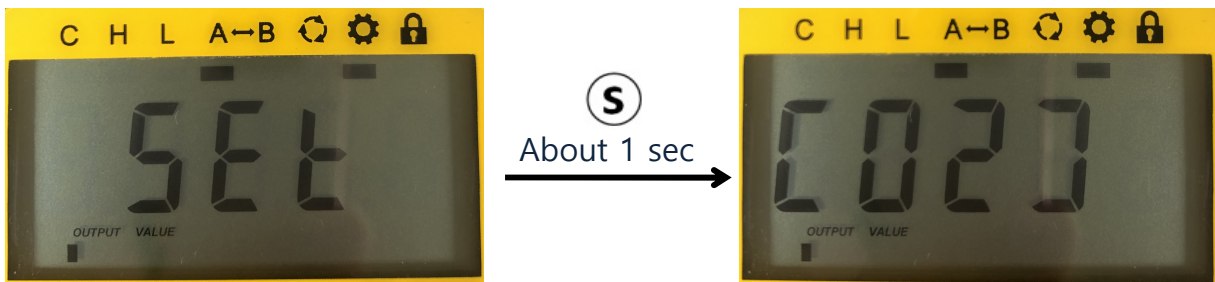


Display Mode	
C	Frequency Value
H	High Setting Value
L	Low Setting Value
A↔B	A : Relay Contact Type N.O B : Relay Contact Type N.C
⌚	Rotation Mode
⚙️	Setting Mode
🔒	Key Lock Statu

- The cursor moves sequentially whenever the (M) button is pressed.
- The order of movement is as follows.

C → H → L → A↔B → ⌚ → ⚙️ → C → H → ...

■ Into the Setting Menu



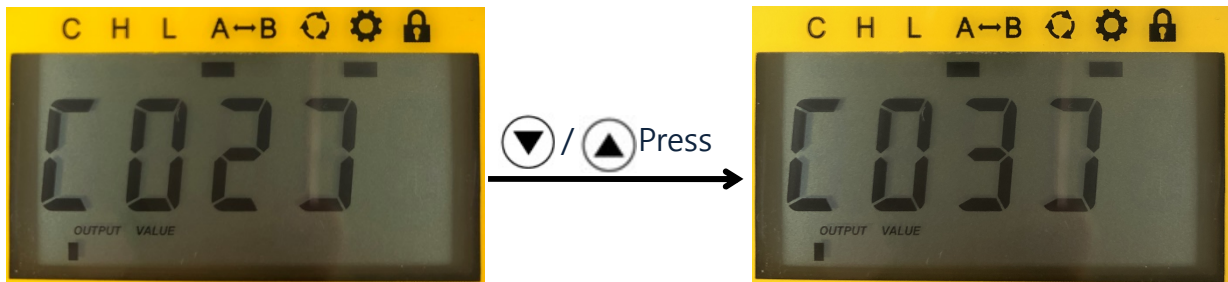
- Press the (M) button to move the display screen to Setting Mode.
- In the Setting Mode, press (S) button for 1 second then the green LED will be flickering and you can go into the Setting Menu.

■ Return to Setting Menu



- In the Setting Menu, press (M) button for 1 second then the green LED will be flickering and you can go back to the Setting Mode.

■ Select the Setting Menu



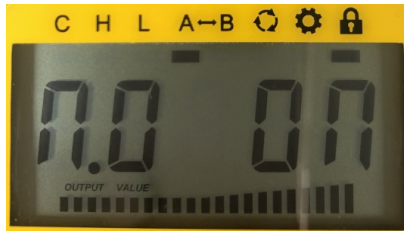
- In the Setting Menu, use / button to select the user setting function.
- Pressing button for 1 second will enter the function.

Key Button	Function
Press shortly	Increasing numerical value
Press shortly	Decreasing numerical value
Press more than 1 sec	Save and Leave
Press more than 1 sec	Leave without Save

5. SETTING Way

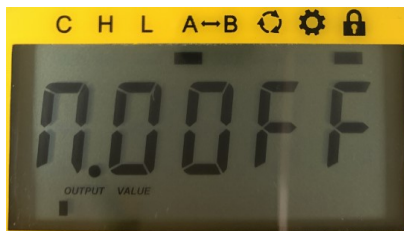
5.1. EASY SETTING

■ When the Fluid is touched the Sensor



- (S), (M), (▲) When pressed at the same time for about 1 second, The LED turns on and off and the value is set.
- Because the initial value is OFF, setting the current value to HIGH Changes to ON and the LED keeps blinking.
- When the High value is set, the Low value is automatically set to be about 3% lower than the High value.

■ When the Fluid is not touched the Sensor



- (S), (M), (▼) When pressed at the same time for about 1 second, the LED turns on and off and the value is set.
- Since the initial value is OFF, if the current value is set to a LOW value, the LED stays on while maintaining the OFF state.
- When the Low value is set, the High value is automatically set to be about 3% higher than the Low value.

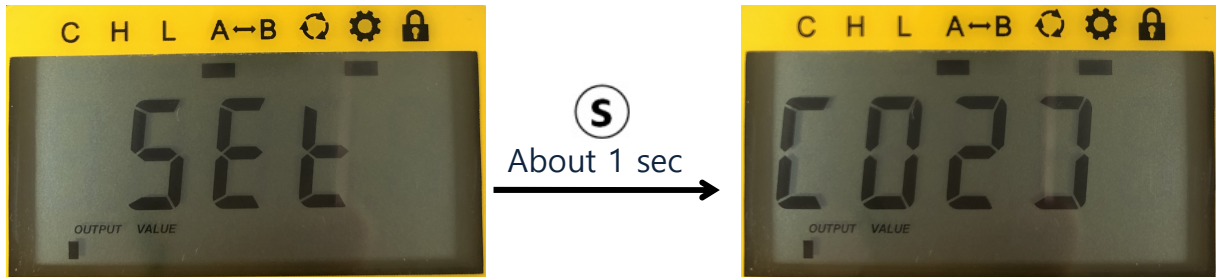
■ Easy Setting and confirm

- Press (M) to confirm C(current value), H(High value), and L(Low value).
- If the value of C is higher than H, the Relay ON status LED keeps blinking.
- If the value of C is lower than L, the Relay OFF status LED is ON.

5.2. DETAIL SETTING

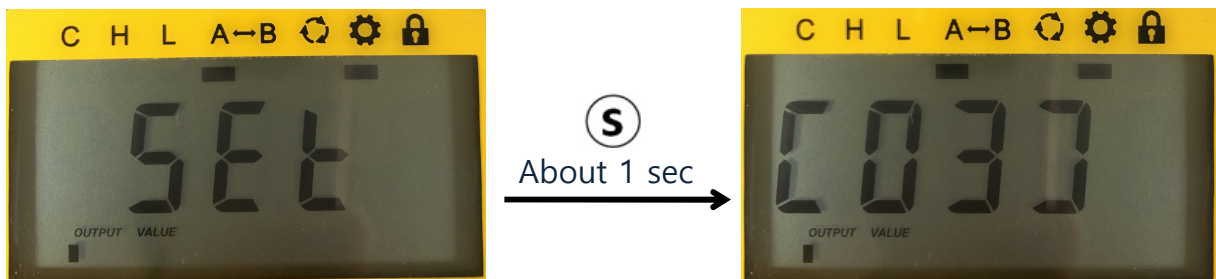
- SETTING Condition : HIGH value \geq LOW value
- HIGH value < LOW value : LED RED is briefly turned on and off witho

■ LOW SETTING



- Enter item 2 in Setting Mode.
- The value displayed on the LCD is the Frequency value.
- When the desired value is reached, press the (S) button for About 1 second to save it.
- For safe operation, set it to the current value.

■ HIGH SETTING



- Enter item 3 in Setting Mode.
- The value displayed on the LCD is the Frequency value.
- When the desired value is reached, press the (S) button for About 1 second to save it.
- For safe operation, set it to the current value.

6.3. Fine Adjustment After EASY/DETAIL SETTING

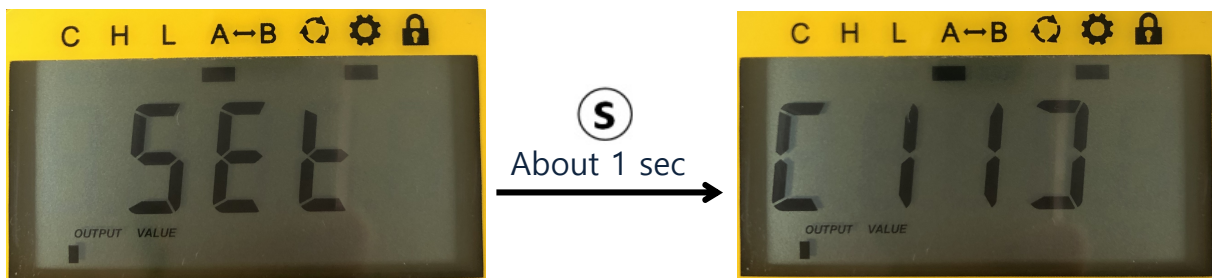
- Use when you want to adjustment values.

1 Up / Down :   Press shortly

10 Up / Down :  /  Press for 1 sec.

100 Up / Down :  -  /  Press shortly

■ LOW value fine Adjustment



- Enter item 11 in Setting Mode.
- The value displayed on the LCD is the set LOW value.
- Use button operation to increase and decrease values and save them.

■ HIGH value fine Adjustment



- Enter item 11 in Setting Mode.
- The value displayed on the LCD is the set HIGH value.
- Use button operation to increase and decrease values and save them.

6. Precautions for Use

- Do not impact the product.
 - Wiring must be done according to the polarity of the power supply.
 - Wire and supply the power to the device after checking the specifications.
 - Pay attention to prevent electric shock.
 - Please refer to the Instruction Manual of this product for more information.
- ◆ More product information can be acquired at our website. (www.hitrol.com)